UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,162	08/24/2001	Trishul M. Chilimbi	50037.60US01	4117

		EXAMINER
7590 03/25/2004		TANG, KUO LIANG J

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ART UNIT	PAPER NUMBER
2122	

DATE MAILED: 03/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/939,162	CHILIMBI, TRISHUL M.
	Examiner	Art Unit
	Kuo-Liang J Tang	2122

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _24 August 2001_.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-26_ is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) _1-26_ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a) ☐ All   b) ☐ Some * c) ☐ None of:

   1. ☐ Certified copies of the priority documents have been received.

   2. ☐ Certified copies of the priority documents have been received in Application No. _____.

   3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date _2-3_.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 1-46 are pending and have been examined. The priority date for this application is

10/17/2000.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2.   Claim 25 recites the limitation "the efficiency" in page 31, line 10. There is insufficient

antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3.   Claims 1-3 and 11-13, 15-16 and 20-26 are rejected under 35 U.S.C. 102(b) as being

anticipated by Larus, "Whole Program Paths", ACM SIGPLAN NOTICES, Vol. 34, No. 5,

Atlanta, GA, May 1999, pp. 259-269 (art of Record).

As Per Claim 1, Larus teaches that whole program paths (WPP) are a new approach to capturing and representing a program's dynamic —actually executed—control flow. (E.g. see Abstract and associated text). In that Larus discloses a method that covering the steps of:

"identifying repetitively occurring data access sequences in a stream of data access references;" (E.g. see pg. 259, line 19-30, which states "… identifies heavily executed (hot) subpaths …", Figure 1 and associated text); and

"displaying a plurality of identifiers, wherein each identifier is associated with one of the data access sequences;" (E.g. see pg. 260, right col. line 1-2, path identifiers; Figure 2 and associated text);

"upon selection of one of the plurality of identifiers, identifying code related to the data access sequence associated with the selected identifier." (E.g. see Section 2 on page 260, Figure 2, Code and Acylic Path Trace for identifier and associated text).

As per Claim 2, the rejection of claim 1 is incorporated and further Larus teaches

"constructing a grammar from the stream of data access references;" (E.g. see Figure 2, SEQUITUR Grammar and associated text).

"building a candidate sequence using the grammar;" (E.g. see Figure 2, symbols S, A, B, C and associated text); and

"if a cost (E.g. see page 263, Section 4.2, 2nd paragraph, subpath's cost) of accessing data in the candidate sequence exceeds a threshold, marking the candidate sequence as a repetitively occurring data access sequence." (E.g. see page 263, Section 4.2, 2nd paragraph, minimal hot subpaths).

As per Claim 3, the rejection of claim 2 is incorporated and further Larus teaches

"computing the cost comprises multiplying a number of times the candidate sequence

occurs in the grammar by a number of data access references in the candidate sequence." (E.g.

see page 263, Section 4.2, 2nd paragraph, subpath's cost).

As per Claim 11, the rejection of claim 1 is incorporated and further Larus teaches

"the code (E.g. see page 260, Figure 2, code and associated text), when previously

executed, referenced data in the data access sequence associated with the selected identifier (E.g.

see page 263, Figure 5, and associated text).".

As per Claim 12, the rejection of claim 1 is incorporated and further Larus teaches

"the stream of data access references is included in a trace file." (E.g. see page 260,

Section 2, 1st paragraph, acyclic path trace).

As Per Claim 13, Larus teaches a system for developing computer-executable software,

comprising:

"an instrumentation tool configured to instrument a software program to produce a trace

when the software program is executed;" (E.g. see page 260, Section 2, 1st paragraph, acyclic

path trace);

"a trace analyzer confgured to receive the trace and identify repetitively occurring data access sequences;" (E.g. see page 260, Section 2, Figure 2, and associated text and page 265, right column, line 7-14, PPCompress); and

"a software development tool configured to use the identified data access sequences in software development." (E.g. see page 265, right column, lines 7-14, Microsoft's Vulcan tool.).

As per Claim 15, the rejection of claim 13 is incorporated and further Larus teaches the trace analyzer identifies repetitively occurring data access sequences by performing steps, comprising:

"constructing a directed acyclic graph (DAG) from the data accesses of the trace file;" (E.g. see page 262, Figure 4. and associated text; and section 3.3 2nd paragraph, DAG);

"building a candidate sequence using the DAG;" (E.g. see page 262, Figure 4. and associated text); and

"if a cost of accessing data in the candidate sequence exceeds a threshold, marking the candidate sequence as a repetitively occurring data access sequence.". (E.g. see page 263, Section 4.2, 2nd paragraph, minimal hot subpaths).

As per Claim 16, the rejection of claim 15 is incorporated and further Larus teaches

"computing the cost comprises multiplying a number of times the candidate sequence is generated using the DAG by a number of data access references in the candidate sequence." (E.g. see page 263, Section 4.2, 2nd paragraph, minimal hot subpaths).

As per Claim 20, is the computer-readable medium (E.g. see Abstract) claim and further

Larus teaches

"displaying a plurality of identifiers, wherein each identifier is associated with one of the

data access sequences;" (E.g. see pg. 260, right col. line 1-2, path identifiers; Figure 2, and

associated text);

"upon selection of one of the plurality of identifiers, identifying code related to the data

access sequence associated with the selected identifier." (E.g. see Figure 2, Code and Acylic Path

Trace for identifier and associated text).

As per Claim 21, the rejection of claim 20 is incorporated and further Larus teaches

"attribute comprises the number of times the associated data access sequence repeats in

the stream." (E.g. see Figure 5 and associated text; and page 263, left column, lines 11-22,

execution frequency).

As per Claim 22, the rejection of claim 20 is incorporated and further Larus teaches

"the attribute comprises the number of data references in the associated data access

sequence." (E.g. see Figure 4, string 121213121214; Figure 5 and associated text).

As per Claim 23, the rejection of claim 20 is incorporated and further Larus teaches

"the attribute comprises a number of unique objects referenced in the associated data

access sequence." (E.g. see Figure 5, symbols S, A, B C and associated text).

As per Claim 24, the rejection of claim 20 is incorporated and further Larus teaches

"the attribute comprises a number of references in the stream between occurrences of the data access sequence." (E.g. see Figure 5-6, and associated text).

As per Claim 25, the rejection of claim 20 is incorporated and further Larus teaches

"the attribute shows the efficiency with which the references of a data access sequence are placed in cache blocks." (E.g. see page 263, left column, last paragraph, context-sensitive metrics).

As per Claim 26, the rejection of claim 25 is incorporated and further Larus teaches "context-sensitive metrics". (E.g. see page 263, left column, last paragraph, context-sensitive metrics). Larus does not explicitly disclose efficiency is calculated by dividing a minimum number of cache blocks in which references of the data access sequence could be placed by an actual number of cache blocks in which references in the data access sequence are placed. However, larus discloses Ammons et al., "Exploiting Hardware Performance Counters with Flow and Context Sensitive Profiling" (E.g. see page 263, left column, last paragraph, context-sensitive metrics). Therefore, cache misses must be in there otherwise, the number of caches misses in a particular execution, cannot be captured in a WPP. Hence, efficiency is inherent because it refers to anything else but cache miss (1 − (ratio of cache miss)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 4-9, 14 and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larus in view of Minard, US Patent No. 6,247,020.

As per Claim 4, the rejection of claim 1 is incorporated and further Larus does not explicitly disclose list of identifiers displayed. However, Minard teaches "the list of identifiers is displayed in a software development tool." that lets the user explore, edit design and debug all in one unified window (E.g. see col. 8:41-43, FIG. 4A, Structure pane 430 and associated text). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to display a list of identifiers in a software development tool. The modification would have been obvious because one of ordinary skill in the art would have been motivated to let the user explore, edit design and debug all in one unified window.

As per Claim 5, the rejection of claim 4 is incorporated and further Larus does not explicitly disclose a visual development environment. However, Minard teaches "the software development tool is a visual development environment." (E.g. see FIG. 3 and associated text). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to run the software in a visual development environment. The modification would have been obvious because one of ordinary skill in the art would have been motivated to provide a user friendly development environment for developer to debug and/or test program.

As per Claim 6, the rejection of claim 4 is incorporated and further Larus does not explicitly disclose the selection is received from a user input device. Minard teaches "the selection is received from a user input device." (E.g. see FIG. 1B, pointing device 105 and associated text). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to have the selection is received from a user input device. The modification would have been obvious because one of ordinary skill in the art would have been motivated to provide a user friendly development environment for developer to debug and/or test program.

As per Claim 7, the rejection of claim 1 is incorporated and further Larus does not explicitly disclose a navigation pane. However, Minard teaches "displaying a navigation pane (E.g. see FIG. 4A, navigation pane 410 and associated text) that displays the list of identifiers and navigates the list in response to user input.". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard into the system of Larus, to provide a navigation pane. The modification would have been obvious because one of ordinary skill in the art would have been motivated to provide a user friendly development environment for developer to debug and/or test program.

As per Claim 8, the rejection of claim 1 is incorporated and further Larus discloses code (E.g. see page 260, Figure 2, Code). Larus does not explicitly disclose the code is displayed and highlighted. However, Minard teaches "the code is displayed and highlighted" (E.g. see col.

11:28-45 and FIG. 4B and associated text). Therefore, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to incorporate the teaching of Minard

into the system of Larus, to display and highlight code. The modification would have been

obvious because one of ordinary skill in the art would have been motivated to provide a user

friendly development environment for developer to easily identify where the corresponding code

is located to debug the program.

As per Claim 9, the rejection of claim 8 is incorporated and further Larus discloses source

code (E.g. see page 260, Figure 2, Code).

As per Claim 14, the rejection of claim 13 is incorporated and is rejected under the same

reason set forth in connection of the rejection of claim 5.

As per Claim 17, the rejection of claim 13 is incorporated and is rejected under the same

reason set forth in connection of the rejection of claim 7.

As per Claim 18, the rejection of claim 17 is incorporated and is rejected under the same

reason set forth in connection of the rejection of claim 7.

As per Claim 19, the rejection of claim 18 is incorporated and is rejected under the same

reason set forth in connection of the rejection of claim 7.

5.   Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Larus in view of

Minard, further in view of Srivastava et al., "Vulcan: Binary transformation in a distributed

environment", Microsoft Research Technical Report MSR-TR-99-76 (replaced by MSR-TR-

2001-50), 1999 (hereinafter Srivastava).

As per Claim 10, the rejection of claim 8 is incorporated and further Larus and Minard

do not explicitly disclose assembly code. However, Srivastava provides means for both static

and dynamic code modification and provides a framework for cross-component analysis and

optimization and teaches "assembly code" (E.g. see Figure 5 and associated text). Therefore, it

would have been obvious to one of ordinary skill in the art at the time the invention was made to

incorporate the teaching of Srivastava into the system of Larus and Minard, to include assembly

code. The modification would have been obvious because one of ordinary skill in the art would

have been motivated to provide variety of code formats for developer to debug and/or test

program.

Conclusion

6.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Kuo-Liang J Tang whose telephone number is 703-305-4866.

The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Tuan Q Dam can be reached on 703-305-4552.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9306.

TUAN DAM
SUPERVISORY PATENT EXAMINER

Kuo-Liang J. Tang

Software Engineer Patent Examiner